

Joseph V. Brady: Synthesis Reunites What Analysis Has Divided

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Joseph V. Brady (1922–2011) created behavior-analytic neuroscience and the analytic framework for understanding how the external and internal neurobiological environments and mechanisms interact. Brady's approach offered synthesis as well as analysis. He embraced Findley's approach to constructing multioperant behavioral repertoires that found their way into designing environments for astronauts as well as studying drug effects on human social behavior in microenvironments. Brady created translational neurobehavioral science before such a concept existed. One of his most lasting contributions was developing a framework for ethical decision making to protect the rights of the people who participate in scientific research.

Key words: Joseph V. Brady, neuroscience, interdisciplinary, research ethics, space research

Joseph Vincent Brady, who was born March 28, 1922, and died July 19, 2011, was among the most influential of the first generation of pioneers in behavior analysis (Figure 1). His professional life was exemplified by Claude Bernard's observation, "synthesis reunites what analysis has divided, and that synthesis therefore verifies analysis" (1967). Although he made numerous important contributions, his most unique lasting influences were the development of a strategy for integrating behavior analysis and neuroscience and articulation of standards for protecting the rights of human participants in research. His pioneering strategies for studying human performance in controlled microsocieties are among his lasting legacies.

Although Brady was not a student of B. F. Skinner, he was greatly influenced by Skinner's functional

analysis of behavior (Brady, 1992; Skinner, 1938) and the principles of experimental physiology promulgated by Claude Bernard (1865–1957). Moreover, Brady was indirectly influenced by Skinner via his doctoral adviser, Howard Hunt, who was a graduate student at the University of Minnesota during Skinner's tenure there. As a wet-behind-the-ears graduate student, I heard stories about Skinner's days at Minnesota. William Heron, who had been a senior faculty member when Skinner joined the department fresh from Harvard University, his head chock full of fanciful ideas of a psychology based on a different type of behavioral unit. In his Learning class in which I was enrolled, Heron said he was not sure how much he thought of young Skinner at the time, despite his illustrious credentials. Heron told students in his class that Skinner could turn matchsticks, string, and chewing gum into an experimental apparatus, but he seldom mentioned the experiments Skinner conducted or their implications. That backhanded praise was typical of Heron, who was difficult to impress. It was only after considerably more time in the field that I began to understand more clearly some of the things that made Skinner special, despite Heron's lack of enthusiasm. For starters, Skinner

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Figure 1. Joseph V. Brady about 1960 at Walter Reed Army Research Institute in Washington, DC, courtesy of Henry Emurian.

launched the field of behavior analysis while at the University of Minnesota by publishing *The Behavior of Organisms* (1938), a promising beginning for a young man just out of graduate school.

Other early behavior analysts made major contributions in their own important ways. Some were great teachers, like Fred Keller (1968) at Columbia and my mentor Kenneth MacCorquodale at Minnesota, who was one of the first graduate students to study with Skinner (Thompson & Zeiler, 1986). Some conducted especially influential research, such as William Estes (Estes & Skinner, 1941), Peter Dews (Barrett & Bergman, 2008), and Ogden Lindsley (Lindsley & Skinner, 1954). Still other more recent contributors explicated the epistemological underpinnings of our discipline. Joseph Brady made all three types of contributions, and in addition had the unique leadership ability to bring together diverse teams of scientists to create entirely new fields of interdisciplinary study. Perhaps more than any person in our field, he was the

spokesperson for behavior analysis to the other sciences, and the liaison to their professional societies and scientific governmental agencies.

THE EARLY YEARS

When I first met Joe Brady at Walter Reed Army Research Institute in Washington, DC in 1961, he was 39 years old and already something of a legend in his own time. I had just finished reading Sidman's recently published *Tactics of Scientific Research* (1960) on the airplane and was interviewing for a position as a postdoctoral fellow. Brady's eminence preceded him. I will refer to Brady familiarly as Joe, because nearly all of his colleagues did, however to the world at large, make no mistake, he was Doctor, Professor, or Colonel Brady.

Joe Brady was among the group of pioneers who came to the field through indirect lineage rather than from Harvard or Columbia universities, as had about half of the originators of the field (see Figure 2). His approach to behavior analysis was correspondingly less orthodox. While many behavior analysts followed Skinner's (1950) lead in rejecting scientific reductionism, from his earliest days Brady enthusiastically embraced variables that reside beneath the skin in his analyses. It wasn't that he theorized about internal causes of behavior; he agnostically incorporated them as potential independent or even dependent variables in his functional analyses. As far as Brady was concerned, behavior analysis and biology were all part of the same scientific discipline. He had no interest in describing behavior in terms at another level of analysis (i.e., explanatory reductionism), but he could think of no reason why physiological and biochemical variables could not be part of his analysis because Nature had not come to him divided into such categories.

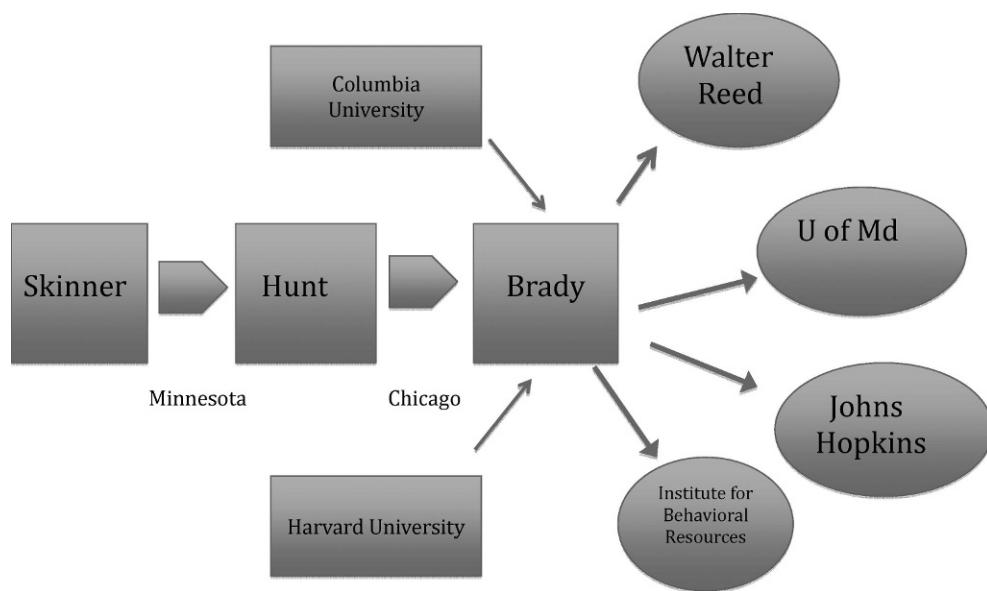


Figure 2. Major scientific lineage of Joseph V. Brady and those whom he mentored.

Brady had graduated from Fordham University in New York midway through World War II (1943) with a bachelor's degree in psychology and, on completing his undergraduate training, served in the U.S. Army in Europe. After his military duty, he applied for graduate school and was accepted at the University of Chicago, where he became Howard Hunt's first graduate student. Hunt had trained at the University of Minnesota during Skinner's tenure there (1936–1945), along with William Estes, Norman Guttman, and other distinguished behavior analysts and psychologists (Thompson, 2008). Hunt graduated from the clinical psychology program at Minnesota, but had enrolled in courses with Skinner. He had become very keen on applying Skinner's theoretical and methodological approach to clinical issues. When he accepted a faculty position at the University of Chicago, Hunt incorporated operant concepts and methods into his research on animal models of psychopathology. He adopted Estes and Skinner's (1941) laboratory model of conditioned anxiety in rats that he had seen at

Minnesota, called the *conditioned emotional response* (CER), which included quantitative measures of suppression of responding maintained by positive reinforcement during a signal prior to an unavoidable shock. The degree of suppression of ongoing positively reinforced lever pressing by rats by a preshock stimulus was hypothesized to be an index of anxiety. Brady worked with Hunt on exploiting Estes and Skinner's model. He was attracted to the no-nonsense, highly objective, atheoretical nature of Skinner's approach, a characteristic of Brady's own work throughout his career. Because Hunt and Brady's goal was modeling a human clinical condition, they decided to test effects of biological interventions used in mental health treatments on this index of anxiety, beginning with electroconvulsive shock and tetraethylammonium (Brady, 1953). Brady and Hunt's collaboration was highly productive, generating a series of widely cited journal articles within a span of several years (e.g., Brady, 1953; Hunt & Brady, 1951).

During the immediate post-World War II era, the U.S. Army was

interested in developing a basic and clinical research program on mental disorders. David Rioch had become the head of the Department of Psychiatry at Walter Reed Army Research Institute and was keen on establishing a division devoted to applied experimental psychology. Rioch's prescience led him to anticipate the importance of interdisciplinary research in advancing neurobehavioral sciences (Rioch, 1958/2010). He contacted Brady, who had just completed his PhD at the University of Chicago (1951). Brady had the combination of qualities Rioch was seeking, and came highly recommended by Hunt. In addition, he retained his military commission, making his appointment simpler than recruiting a comparable civilian. Brady headed up the new psychology program and was given wide latitude in recruiting a new research team. When possible, Brady was encouraged to hire highly qualified people who already held military ranks, which reduced bureaucratic hurdles. Brady consulted with Skinner, Keller, and Nat Schoenfeld for possible candidates for his openings, recognizing the potential of the rising stars in this new field of behavior analysis before most of the rest of psychology was even aware such a field existed.

Brady established one of the first truly interdisciplinary "physiological psychology" research programs (now called neuroscience) in the country. The initial lineup began with Murray Sidman, Richard Herrnstein, and John Boren, who were also among members of the first editorial board of the *Journal of the Experimental Analysis of Behavior*. Among others Brady recruited in the early years were Philip Hinzline, William Hodos, Eliot S. Hearst, Bernard Beer, Solomon Steiner, and Harold Williams. A few years later, after establishing a satellite laboratory at the University of Maryland in College Park, Brady recruited Charles B. Ferster, Lewis Gollub, Jack Findley, Stanley Pliskoff, Charles R. Schuster, and me to join his team.

Evelyn Segal joined the laboratory briefly but left to accept a position at San Diego State College in 1960.

This impressive group of behavior analysts was only half of Brady's research team. The remainder included neuroscientists Larry Stein, William Stebbins, Eliot Valenstein, Walle J. H. Nauta, and Robert Galambos, all world-class researchers in electrophysiology, neuroanatomy, and behavioral neuroscience. Brady enlisted additional neurobiological collaborators from within other departments at Walter Reed as part of the collaborative team, such as neurophysiologist John W. Mason and pathologist R. W. Porter. Such a remarkable array of collaborative talent working in close collaboration was unprecedented.

From the outset, Brady committed himself to the notion that behavior analysis and neurobiology comprised a single research discipline, and the dividing line between the skin and behavior was artificial, as Skinner (1945) had earlier pointed out. The shared feature of this interdisciplinary field consisted of objectively measurable neurobiological and more familiar environmental and behavioral variables, studied using a common functional analysis strategy. The only differences were the physical locus of the variables, which Brady considered insignificant.

BRADY THE SCIENTIST

Few people rise to such eminence as highly visible leaders, mentors, and administrators in science without first establishing their credentials as outstanding scientists in their own right. Brady was unmistakably one of the very best of the best. Among his scientific accomplishments were conducting one of the first studies of subcortical electrical brain self-stimulation (Sidman, Brady, Boren, & Conrad, 1955), examining the behavioral effects of drugs on operant behavior (Sidman et al., 1955),

operant conditioning of autonomic function (Harris, Findley, & Brady, 1971; Harris, Gilliam, & Brady, 1974), and the famous ulcers in the "executive monkeys" study (Brady, Porter, Conrad, & Mason, 1958). He was also one of the first to clearly articulate the outlines of the field of behavioral pharmacology (Brady, 1958).

Brady was recruited by Richard Belleville at the National Aeronautics and Space Administration (NASA) to design a way of studying the behavior of chimpanzees, Ham and Enos, in suborbital space flight. The goal was to emulate behavior of human astronauts under similar conditions (Belleville, 1963). Later while at Johns Hopkins, Brady led a research team studying the relation between experimental conditions that give rise to stress and their cardiovascular consequences (Brady, 1974). He was also a leader in developing preflight and in-flight testing protocols for astronauts (Bigelow, Emurian, & Brady, 1975; Brady, 1982).

Brady was a distinctively results-oriented scientist. He and his colleagues were extraordinarily productive, suggesting a very high rate of payoff for their efforts. As a result, it came as something of a surprise to some to discover that Brady also had unexpectedly high tolerance for some less predictable research, in which the outcomes were far less assured. Early on, he recognized that Jack D. Findley was exceptionally bright and an unorthodox scientific thinker with great promise. Brady encouraged Findley to undertake a series of complex studies, building on the notion of the "24-hour experimental session." That work led to remarkable series of theoretically important studies published in 1962 that was an extension of his notion of creating and studying complex operant behavioral repertoires, *An Experimental Outline for Building and Exploring Multioperant Behavior Repertoires* (Findley, 1962). Findley's work significantly changed the way we under-

stand conditioned reinforcement and choice behavior and their temporal distribution. Findley's work also led to the study of human performance over a period of months in a controlled multicompartment living environment emulating a space station, the first of its kind (Findley, Migler, & Brady, 1963).

BRADY THE SCIENTIFIC ADMINISTRATOR

In addition to establishing an internationally renowned research program at Walter Reed Army Research Institute, in 1957, Brady became Director of the Psychopharmacology Laboratory and a faculty member in the Psychology Department at the University of Maryland in College Park. The name Psychopharmacology Laboratory was something of a misnomer. The laboratory's work included behavioral pharmacology (as distinguished from psychopharmacology, which dealt with mental and emotional effects of drugs) and a broader array of basic behavior-analytic research that had nothing to do with pharmacology. The Psychopharmacology Laboratory was housed in Building DD, a temporary structure that had been an army barrack during World War II, which included several nonhuman behavioral pharmacology experimental rooms as well as Findley and Brady's NASA human ECHO Project (Findley et al., 1963). It was in this humble laboratory setting that Charles R. (Bob) Schuster and I conducted one of the first intravenous drug self-administration studies of addiction with rhesus monkeys (Thompson & Schuster, 1964) which later was adopted by the World Health Organization (1978) for testing of addiction liability of new medications throughout the world.

BRADY: LIAISON OF BEHAVIOR ANALYSIS

Few in the field of behavior analysis have had a more profound

effect on explaining our discipline to the rest of psychology and the other sciences than Joe Brady. Early in his career, he recognized the first premise of effecting policy change: "Eighty percent of success is showing up." Other researchers avoided the bureaucratic aspects of participating in national committees and task forces, but Brady accepted positions on numerous influential national bodies that provided a foundation for introducing behavior analysis widely throughout the sciences. He was able to integrate the contributions of behavior analysis into the funded research agenda in behavioral science, mental health, substance abuse, and space medicine in ways that would otherwise have been very unlikely to occur. Among his more important positions were Member, Life Sciences Panel, President's Science Advisory Committee (1961–1963); Chairman, National Institutes of Health Study Section (1972–1976, 1979–1984, 1989–1994); Chairman, National Academy of Sciences Committee on Problems of Drug Dependence (1981–1983); Associate Chairman, National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research (1974–1979); Member, Committee on Space Biology and Medicine, National Academy of Sciences (1984–1988); Member, NASA and National Institutes of Health Scientific Advisory Committee on Biomedical and Behavioral Research (1995); Distinguished Scientific Contribution Award, American Psychological Association (1992); President, Society of Behavioral Medicine (1979); and Distinguished Scientific Service Award, Association for Behavior Analysis (1996).

BEHAVIORAL BIOLOGY AT JOHNS HOPKINS

Later, Brady moved his base of operations from Walter Reed and College Park to create the Division of Behavioral Biology in the Depart-

ment of Psychiatry and Behavioral Sciences at the Johns Hopkins University Medical School in Baltimore. Joel Elkes, who was the overall Chair of Psychiatry at Hopkins, had recruited him. Brady brought Jack Findley with him from College Park, and among his first external recruits were University of Minnesota PhDs George Bigelow and Roland Griffiths, Maxine Stitzer (PhD, Michigan), and Nancy Ator (PhD, Maryland). Together they established one of the first human behavioral pharmacology laboratories in the country, which included an experimental hospital unit for studying drug-behavior interactions in collaboration with psychiatrist Ira Liebson (Liebson, Bigelow, & Flamer, 1973). Operant behavioral principles and technologies were at the root of their research.

TRANSLATIONAL RESEARCH AND THE RESIDENTIAL LABORATORY¹

Well in advance of the national recognition of the need for effective for translational science (Zerhouni, 2005), Brady was developing strategies for effectively and efficiently applying the scientific innovations emerging from his basic research activities for improved human health. Brady conceived of a plan to apply and extend the innovations that flowed from the experimental analysis of behavior to the human condition. This plan centered around the development of a human experimental laboratory that permitted the testing of behavioral principles that emerged from basic research on complex human behavior under experimentally controlled conditions. Because a feature of projected spaceflight beyond the Earth's orbit would be extended stays by human groups

¹This section of the paper was originally drafted by Thomas Kelly; I wish to express great appreciation for his skillful reporting of this era in Joseph Brady's work.

in extraterrestrial vehicles and habitat, Brady approached NASA with the idea of creating a residential laboratory for the experimental analysis of behavior-management procedures with human groups in long-term isolation. He argued persuasively that functional ecological models for space-dwelling human microsocieties should be based on sound scientific principles of behavior management derived from the experimental analysis of behavior. NASA was convinced.

Soon after establishing the Division of Behavioral Biology in the Department of Psychiatry at the Johns Hopkins University School of Medicine in 1970, Brady had asked George Bigelow and Henry Emurian to join him in developing the Programmed Environment Research Center with funding from NASA (Bigelow et al., 1975). They initially examined behavioral processes specifically relevant to the behavioral challenges of space travel, including group structure and sustained function (Emurian, 1988), individual and social adjustment (Emurian et al., 2009), and sustained motivation and performance effectiveness (Brady, Bernstein, Foltin, & Nellis, 1988).

This early work served as the foundation for a clinical study of flight-crew performance conducted before, during, and after NASA Shuttle Flight STS-89 (Kelly, Hienz, Zarcone, Wurster, & Brady, 2005). While conducting this study, Brady capitalized on features of the behavioral research in the programmed environment to use computer-simulation software. After completing the Space Shuttle study, Brady successfully obtained additional NASA funding. In collaboration with Steve Hursh, whom Brady had recruited as president of the Institutes for Behavioral Resources, Inc. (the nonprofit research, services, and educational organization Brady had established in 1960), and Bob Heinz, a long-time collaborator in behavioral biology at the Johns Hop-

kins University School of Medicine, Brady began conducting computer-simulation studies of social processes relevant to flight-crew performance; these studies continue to this day.

Brady recognized the breadth of translational opportunities afforded by the Programmed Environment and in 1984 he recruited Marian Fischman to the Division of Behavioral Biology to direct research on the effects of drugs of abuse on social, motivational, and nutritional processes, and to expand study of the role of environmental modulation of drug-taking behaviors in collaboration with Richard Foltin (Fischman, Foltin, & Brady, 1988; Foltin, Brady, Fischman, Emurian, & Dominitz, 1987; Foltin et al., 1990). Later, Brady shifted his attention to the growing opioid abuse problem in "beautiful downtown Baltimore," as Brady described his community. He recognized that despite the well-established efficacy of methadone treatment, individuals dependent on opiates endured long waiting lines to enter treatment; this in excessive drop-out rates due to the lack of availability of local treatment programs. Expansion of treatment programs was hindered by community concerns related to allowing drug abusers into the area. Applying the principles that emerged from his basic and clinical drug studies, Brady altered the traditional model of requiring opioid abusers to come to facilities to receive treatment by converting mobile homes to serve as treatment facilities and, thus, brought methadone treatment to opioid abusers. This approach proved to be highly effective (Greenfield, Brady, Besteman, & De Smet, 1996), and mobile treatment continues to be offered to the citizens of Baltimore through the Institutes for Behavioral Resources.

BRADY THE MENTOR

Brady described himself as a "research center guy," a person who had little tolerance for academic departments,

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| Anderson, David (JH) | Hodos, William (WR) |
| Ator, Nancy (JH) | Hearst, Elliot (WR) |
| Beer, Bernard (WR) | Iversen, Iver (JH) |
| Bernstein, Dan (JH) | Kelly, Thomas (JH) |
| Boren, John (WR) | Krasnegor, Norman (MD) |
| Finoccio, Dom (WR) | Lukas, Scott (JH) |
| Bigelow, George (JH) | Migler, Bernard (WR) |
| Bradford, Dianne (JH) | Pliskoff, Stanley (MD) |
| Cataldo, Michael (JH) | Samerud, Christine (JH) |
| Emurian, Henry (JH) | Schuster, Charles R. (MD) |
| Findley, Jack (MD) | Segal, Evalyn (MD) |
| Foltin, Richard (JH) | Sidman, Murray (WR) |
| Hursh, Steve (IBR) | Silverman, Kenneth (JH) |
| Ferster, Charles B. (MD) | Stebbins, William (WR) |
| Fischman, Marian (JH) | Stein, Larry (WR) |
| Geller, Irving (WR) | Stoddard, Larry (WR) |
| Gollub, Lewis (MD) | Thompson, Travis (MD) |
| Griffiths, Roland (JH) | Vallenstein, Elliott (WR) |
| Harris, Alan (JH) | Winger, Gail (JH) |
| Herrnstein, Richard (WR) | Zarcone, Troy (JH) |
| Hienz, Robert (JH) | Zimmerman, Joseph (MD) |

Figure 3. Professionals mentored by Joseph V. Brady who have made significant contributions to behavior analysis, of the over 90 people who were recruited or trained with him (based on presentation at the P. B. Dews Award Ceremony at the meeting of the Behavioral Pharmacology Division, Association of Pharmacology and Experimental Therapeutics, 2004).

disciplinary boundaries, and traditional university committees and requirements, but thrived on the hurly burly uncertainty of soft-money multidisciplinary environments, where any good idea might find its way into the laboratory. He worked best with people capable of a high degree of independence. His forte was mentoring postdoctoral fellows and young faculty members. The list of his mentees is legion (see Figure 3).

It is difficult to think of a specific technique or experimental method I learned from him, although I learned an important foundational strategy for doing research that has remained with me throughout my career. Brady seldom explained “*the correct way*” to do research; rather, he demonstrated how research was actually done by modeling his approach to doing science. One learned by watching what he did. After spending 2 years with him, I found it next to impossible to work with people who were incapable of thinking beyond disciplinary boundaries and who

were uncomfortable with unorthodox problem-solving strategies.

Brady surrounded himself with the brightest people he could find, often from multiple disciplines with diverse expertise with a range of useful technologies at their fingertips. From my first contacts with him, I was impressed that no one, no matter how brilliant, seemed to overawe Brady. He viewed each as a kindred spirit, as an important component of an unwieldy intellectual device he was in the process of constructing. Sometimes it was difficult to get all the pieces to fit together properly, and progress was subject to fits and starts, but with a bit of coaxing, he eventually created a remarkable symbiotic mutually beneficial research team that usually produced innovative results.

All who worked with Brady were treated with respect regardless of their discipline. His strategy was to provide members of his scientific teams with the basic resources to do their work, arrive at a mutually agreed-upon approach to a problem, and then

stand back. Some of the people on Brady's teams could easily have been seen as *prima donnas*, but when a researcher was part of Brady's circle, none of that mattered because they were working together toward a common goal. It was obvious that, as a member of Brady's group, one was part of a very special enterprise, although that was not something one discussed. The undertaking may not have appeared extraordinary from the outside, but it was. Although Brady provided considerable free reign, he regularly monitored progress, nudged from time to time, challenged assumptions, and if necessary stepped in and made more significant changes in direction. But mostly he questioned, prodded, and intellectually challenged what we were doing and provided support at the right moment.

BIG-PICTURE THINKER

Joe Brady seldom talked scientific theory. Perhaps he viewed participating in theoretical discussion, like writing about music, only for those who could not play an instrument or sing. Perhaps it was not part of his persona. He left theorizing for others, like one of his closest friends, Murray Sidman (Sidman, personal communication, May 3, 2012). Despite his philosophical reticence, Brady's own research enterprise was at the conceptual cutting edge of an important theoretical notion Skinner later discussed: "A comprehensive set of causal relations stated with the greatest possible precision is the best contribution which we, as students of behavior, can make in the co-operative venture of giving a full account of the organism as a biological system" (Skinner, 1972, pp. 269–270). I have written about such an integrated approach elsewhere:

When a variable in one system also functions as a variable in a second system, it becomes useful to explore the relationships among systems as suggested by Mach (1897/1959) and Mayr (1982). Though one system need

not be reduced to the other, there will likely be enduring influences upon our understanding of various systems that extend the reach of the analysis of each. (Thompson, 2007, p. 424)

This reasoning is at the heart of much of Brady's research over the course of his career.

Brady grew up in the rough-and-tumble world of 1920s and 1930s Brooklyn, New York, and didn't feel comfortable talking in quixotic theoretical terms. But a year or two before he died, I received an e-mail message from him indicating that he had just read an article I had published, "Relations Among Functional Systems in Behavior Analysis," that had appeared in the *Journal of the Experimental Analysis of Behavior* (Thompson, 2007). In the paper I had proposed that an organism's integrated repertoire of operant behavior has the status of a biological system, similar to other systems, like the nervous, cardiovascular, or immune systems. I suggested that a good deal of what is viewed as biological (often thought to be inaccessible or hypothetical) could be made publicly measurable variables using currently available and developing technologies. Moreover, such endogenous variables could serve as establishing operations, discriminative stimuli, conjoint mediating events, and maintaining consequences within a functional analysis of behavior and need not lead to reductionistic explanation. Brady said that the article compellingly expressed what he had been trying to do throughout his career. So perhaps I was able to give voice to Brady's theoretical intentions that he had seldom expressed.

BRADY ON ETHICS

One might have expected that Brady would have been at home with Dewey's (1922) pragmatic ethics or drawn to Max Hocutt's (2000) *Grounded Ethics*. In fact, it appears he was more comfortable with the views of Thomas Aquinas (1265–

1274/2006) or Thomas Percival (1849) regarding ethical and moral decision making. Despite his deep scientific roots and very strong pragmatic bent, Brady was the product of the Roman Catholic parochial school system where he grew up in New York. In particular, his commitments to the dignity of each person, rights and responsibilities, and caring for the vulnerable were unshakeable. They were at the core of his values, which later in his life he applied to one of his more important contributions. As much he was committed to the essential importance of the scientific method in illuminating the human condition, his basic moral and ethical beliefs that originated in his childhood appear to have led him to accept a leadership role with the National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research. That commission issued the landmark Belmont Report (Brady, 1978). That critically important document that he shepherded through years of deliberations and various drafts, promulgated far-reaching national policies to protect the rights of vulnerable populations in research, including children, the elderly, the mentally ill, the intellectually disabled, and prisoners. The Belmont Report stands today as the standard ethical framework for all research with human participants in the United States.

LASTING LEGACY

Claude Bernard, the intellectual force behind modern physiology, wrote, "In the organism, physiology is the executive branch; but the legislative branch is creation" (Bernard, 1967). Joseph Brady created behavior-analytic neuroscience, and hence was in charge of overseeing the organism's legislative branch and extending the approach to behavior analysis as well. He created the analytic framework for understanding how the external and internal neurobiological environ-

ments and mechanisms interact. Brady's approach offered synthesis as well as analysis. He embraced Findley's approach to constructing multi-operant behavioral repertoires that found their way into designing environments for astronauts as well as studying drug effects on human social behavior in microenvironments. It was easy to be misled by his witty maxims and gregarious "hail fellow" demeanor, because he was very much a big-picture thinker. Brady created translational neurobehavioral science before such a concept existed (*Nature*, 2008). One of his most lasting contributions was creating a framework for ethical decision making to protect the rights of people participating in scientific research.

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